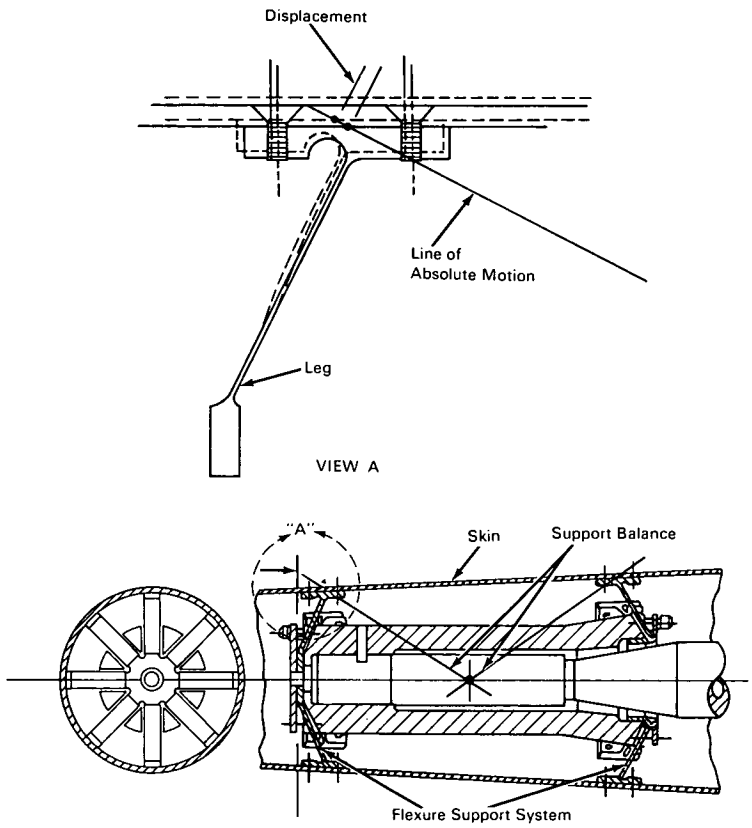
NASA TECH BRIEF

Flexure Support System Protects Thermally and Dynamically Loaded Models



The problem: Thin-skinned models subjected to high temperatures and aerodynamic forces experience skin dimpling, buckling, or rupture when rigidly fastened to supporting structures. A support system is needed that will rigidly support the model but will also allow thermal expansion of the model skin both diametrically and axially without dimpling, buckling, or rupture.

The solution: Two multilegged flexure supports with lengthwise axes approximately normal to the line of absolute motion of the model skin at the leg attachment points are rigidly mounted facing each other on an inner cylinder which is in turn mounted on a support.

How it's done: The design takes advantage of the principle that differential thermal expansion can be

(continued overleaf)

minimized in structures supporting bodies subjected to high temperatures by setting the lengthwise axes of the supporting legs approximately normal to the line of absolute motion of the structure they support. A small variation from the normal is required to compensate for temperature gradients in the legs and central support. Each support consists of eight long, slender, but wide legs that extend outward from the center to form a shallow cone. The depth of the cone is related to the diameter of the model supported and the distance between the base of the legs and the support inner cylinder.

As the model skin expands, the support legs flex to form an S-curve and the leg feet move with the skin.

Notes:

1. This support system could also be used to connect two bodies subject to slight relative motion.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Langley Research Center
   Langley Station
   Hampton, Virginia, 23365
   Reference: B65-10042

Patent status: NASA encourages the immediate commercial use of this innovation. It is owned by NASA, and a patent application has been filed. Royalty-free nonexclusive licenses for its commercial use are available. Inquiries concerning license rights should be made to NASA, Code AGP, Washington, D.C., 20546.

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